

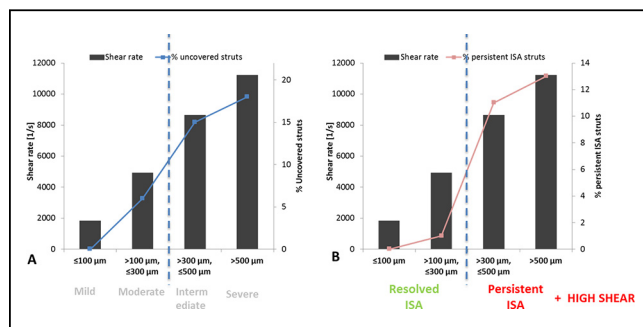
TCTAP A-083**Incomplete Stent Apposition Causes High Shear Flow Disturbances and Delay in Neointimal Coverage as a Function of Strut to Wall Detachment Distance: Implications for Stent Optimization**

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BACKGROUND Lack of re-endothelialization and neointimal coverage on stent struts has been put forward as the main underlying mechanism leading to late stent thrombosis. Incomplete Stent Apposition (ISA) has been frequently observed in patients with very late stent thrombosis after DES implantation, suggesting a role of ISA in the pathogenesis of this adverse event. The aim of this study was to evaluate the impact of different degrees of ISA severity on abnormal shear rate and healing response with coverage, due to its potential implications for stent optimization in clinical practice. We characterized flow profile and shear distribution in different cases of ISA with increasing strut-wall detachment distance (ranging from 100 μ m to 500 μ m). In-vivo impact on strut coverage was assessed retrospectively using Optical Coherence Tomography evaluation on 72 stents (48 patients) sequentially at baseline and after 6 months follow-up.

RESULTS Protruding strut and strut malapposed with moderate detachment (ISA detachment distance < 100 μ m) have minimal disturbance to blood flow as compared with floating strut that has more significant ISA distance. Analysis of coverage revealed an important impact of baseline strut-wall ISA distance on the risk of incomplete strut coverage at follow-up. Malapposed segments with an ISA detachment < 100 μ m at baseline showed complete strut coverage at follow-up whereas segments with a maximal ISA detachment distance of 100-300 μ m and >300 μ m had 6.1 % and 15.7 % of their struts still uncovered at follow-up respectively (p < 0.001). Finally, a study performed in-vivo animal model, in which a series of stent were implanted with a controlled under-expansion, confirmed the impact of stent apposition as well as platform design on the coverage process.



CONCLUSION Flow disturbances and risk of delayed strut coverage both increase with ISA detachment distance. Insights from this study are important for understanding malapposition as a quantitative, rather than binary phenomenon (present or absent), and to define the threshold of ISA detachment that might benefit from optimization during stent implantation.

NON-INVASIVE CARDIAC IMAGING: CTA, MRI, 3D-ECHO, AND OTHER (TCTAP A-084 TO TCTAP A-085)

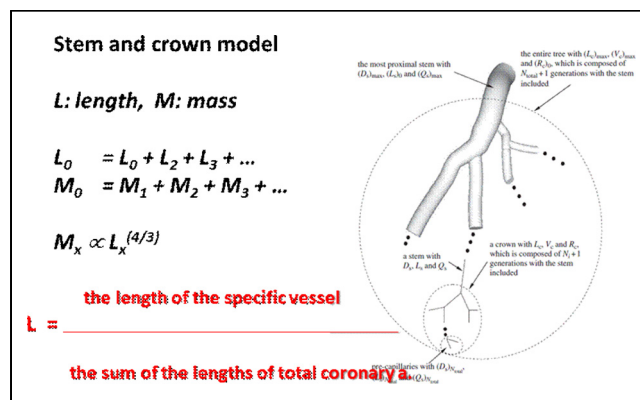
TCTAP A-084**Lesion-Specific Myocardial Mass: A New Index for Diagnosis and Treatment of Coronary Artery Disease**

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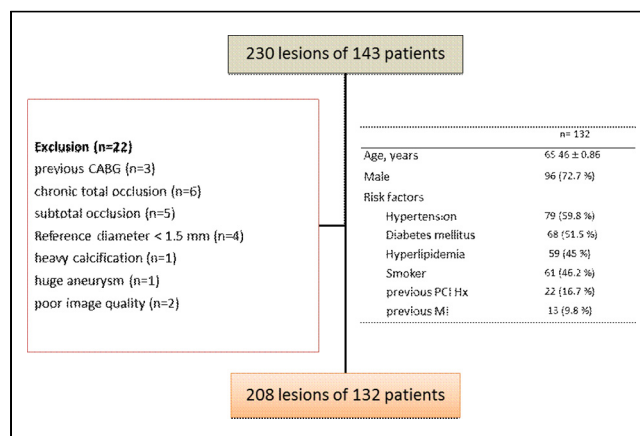
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BACKGROUND Accurate quantification of the myocardial mass by coronary computed tomography angiography (CCTA) has become

available. And lesion-specific myocardial mass (LMM) could be estimated with clinical applications of allometric scaling law. The aim of this study was to estimate the influence of the amount of lesion-specific myocardial mass on the diagnostic performance of %DS to predict functional ischemia defined as fractional flow reserve (FFR) < 0.80.

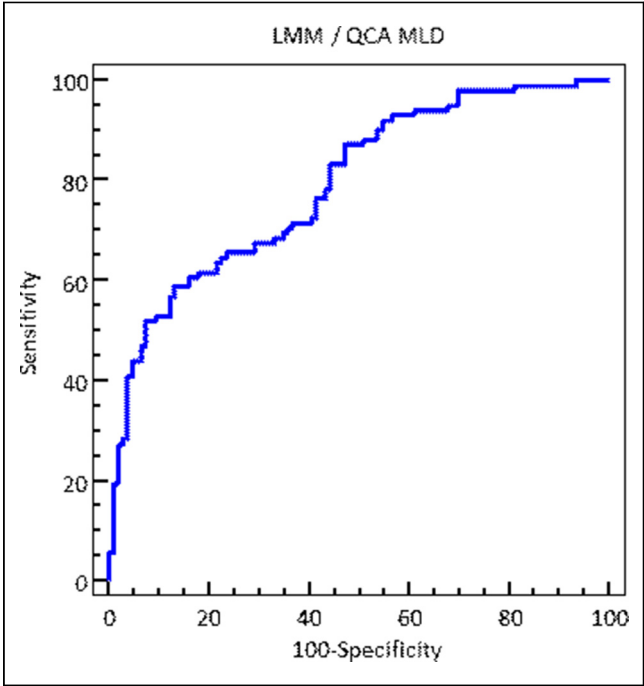
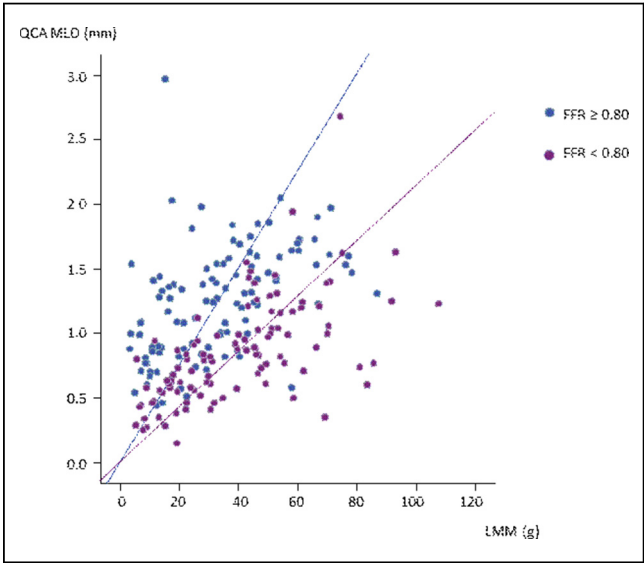


METHODS CCTA and FFR were performed to evaluate 208 lesions in 132 patients. Index of myocardial ischemia was defined as FFR < 0.80. Total and lesion-specific myocardial mass was estimated using CCTA measurements based on allometric scaling method. And the lesion-specific myocardial mass was defined as each myocardial mass per each supply vessel. Bivariate analysis was performed to estimate correlation between FFR and %DS in accordance with the amount of lesion-specific myocardial mass.



RESULTS Ischemia was observed in 102 lesions. The mean FFR value was 0.75 ± 0.11 . Lesions with FFR ≤ 0.8 had less minimal luminal diameter and more % DS of ICA.

And also had less MLA and more %DS of CCTA. Mean total myocardial mass of CCTA was 108.20 (g) and mean lesion-specific myocardial mass was 36.51 (g). We found that, at the same anatomic severity of stenosis, larger LMM tend to produce more functionally significant ischemia. Lesions with larger LMM and/or smaller MLD produced more significant functional ischemia. Further analysis using LMM divided by MLD as a new index was performed to assess its diagnostic performance to predict functionally significant ischemia. With the best cut-off value of 38.4, the AUC of the ROC were 0.79 with 59% of sensitivity and 87% of specificity.



	TOTAL (n=208)	FFR > 0.8 (n=106)	FFR ≤ 0.8 (n=102)	p-value
FFR	0.75±0.11	0.87±0.04	0.63±0.014	0.001
% DS _{QCA}	63.55±1.15	54.50±1.37	72.97±1.35	0.001
MLD _{QCA}	1.05±0.03	1.25±0.59	0.85±0.03	0.001
Lesion length _{QCA}	15.22±0.42	14.58±0.59	15.89±0.60	0.12
MLA _{CT}	1.21±0.036	1.37±0.048	1.05±0.048	0.001
% DS _{CT}	59.88±0.81	57.70±1.10	62.19±1.15	0.005
Lesion length _{CT}	20.17±0.88	16.37±0.81	24.20±1.49	0.001
LMM	36.51±1.49	33.27±1.95	39.89±2.24	0.027
total LVM	108.20±1.85	109.13±2.76	107.24±2.46	0.611

CONCLUSION Lesion-specific myocardial mass (LMM) can be calculated from CT by allometric scaling law. LMM showed weak correlation with RD and MLD, and weak negative correlation with DS%. A new index, LMM/MLD was predictive for ischemia as well as DS % (FFR <0.8).

TCTAP A-085
Impact of Early ST-Segment Changes on Magnetic Resonance Imaging Verified Microvascular Dysfunction in the Sub-Acute Phase of ST Elevation Myocardial Infarction

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BACKGROUND The relationship between different early ST-segment change parameters and magnetic resonance (MR) imaging verified intramyocardial hemorrhage (IMH) in the sub-acute phase of ST Elevation Myocardial Infarction (STEMI) remains to be clarified, and which ST-segment change parameter was the most powerful predictor of microvascular obstruction(MVO) or IMH is conflicting. The object of this study was to investigate the relationship between different parameters of early ST-segment change measurement and MR imaging verified MVO along with IMH in the sub-acute phase of STEMI.

METHODS 108 STEMI patients who received reperfusion therapy and had no contraindication of cardiac magnetic resonance (CMR) investigation were recruited in this study. Sum ST-segment elevation (STE), maximal STE on admission and sum ST-segment resolution (STR), single lead STR, residual maximal STE, and STE index variation at 60 min after successful percutaneous coronary intervention (PCI) were assessed based on the 12-lead ECG. The MVO and IMH were determined by contrast-enhanced CMR.

RESULTS 30 patients with MVO(-)/IMH(-), 25 with MVO(+)/IMH(-) and 53 with MVO(+)/IMH(+).Sum STE(p=0.001),maximal STE (p<0.001) and residual STE (p=0.025)were highest in the MVO(+)/IMH(+) group, intermediate in the MVO(+)/IMH(-) group and lowest in the MVO(-)/IMH(-) group. Single lead STR were lowest in the MVO(+)/IMH(+) group, intermediate in the MVO(+)/IMH(-) group and highest in the MVO(-)/IMH(-) group (p=0.040).ROC analysis revealed maximal STE was the most powerful factor for distinguishing MVO(+) and MVO(-) patients(optimal threshold=0.5mV,AUC = 0.718, p<0.001), or IMH(+)and IMH(-) patients(optimal threshold=0.5mV, AUC= 0.697, p<0.001). On multivariate analysis, maximal STE was identified as the most powerful independent predictor of MVO (OR=4.30, p<0.001) and IMH (OR=2.44,p=0.001). However, sum STE was the strongest correlator of both the number of MVO segments(r=0.424, p<0.001) and IMH segments (r=0.433, p<0.001).

CONCLUSION In the sub-acute phase of STEMI, the presence of MVO and IMH in infarcted tissue relates to ST-segment changes. Maximal STE was the most powerful independent predictor of presence of MVO and IMH, while Sum STE was the strongest correlator of number of MVO and IMH segments.